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QUANTIFICATION OF SELECTED VOLATILE ORGANICS AT THE UPPER OTTAWA STREET LANDFILL SITE

URBAN MUNICIPAL
APR 30 1987
GOVERNMENT DOCUMENTS

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February 28, 1983

QUANTIFICATION OF SELECTED VOLATILE ORGANICS
AT THE UPPER OTTAWA STREET LANDFILL SITE

A Comparison of Passive Emmission Versus Active Pumping

The successful pumping and flaring experiments conducted in December 1982 by Conestoga-Rovers & Associates and Mann Testing Laboratories concluded that collection and flaring was an acceptable method of controlling the landfill gas emmissions. The point in question was whether the gas be collected by active pumping of passive collection. Concerns were raised by the committee that although active pumping could better contain and control the landfill gas, would active pumping actually serve to increase the concentration of volatile organics in the landfill gas? With this question in mind, a pumping experiment was performed to determine the concentration of selected volatile organics with and without pumping. It was decided beforehand to quantify six key compounds known to be present in the landfill gas. These were benzene, toluene, total xylenes, naphthalene, dichlorobenzene and 1,1,1 trichloroethane. Tetrachloroethylene was added to this list during the analysis. Gas bag samples were taken from the Conestoga Well without pumping, and during various times throughout a 24 hour continuous pumping. Gas bag samples were also taken from the shallow gas probes and goose neck vents. The samples were analysed at the laboratory the same day by gas chromatography (GC/FID and GC/ECD).

The samples were screened for benzene, toluene, xylenes, naphthalene, 1,1,1 trichloroethane, dichlorobenzene and tetrachloroethylene. The naphthalene and dichlorobenzene were below the limits of detection in all samples and are not reported here. Benzene, toluene, xylenes and naphthalene were screened by GC/FID; limit of detection 3 ppm. Dichlorobenzene, 1,1,1 trichloroethane and tetrachloroethylene were screened by ECD; limit of detection 0.005 ppm. The results are listed in Table 1.

TABLE 1

CONCENTRATION OF SELECTED COMPOUNDS AT THE UPPER OTTAWA STREET LANDFILL SITE

	Concentration In PPM				
	Benzene	Toluene	Xylene	1,1,1 TCE	Tetra
Shallow Gas Probe #1	5	185	63	1.3	0.18
Shallow Gas Probe #2	4	183	56	0.3	0.17
Goose Neck Vent #1	6	126	64	0.6	0.19
Goose Neck Vent #2	5	126	80	1.7	0.21
Conn Well - No Pumping	N/A	172	45	5.2	0.32
Conn Well - No Pumping	N/A	203	63	6.9	0.35
Conn Well - Pumping 1 HR	N/A	170	61	7.1	0.16
Conn Well - Pumping 3 HR	N/A	212	75	14.6	0.55
Conn Well - Pumping 3 HR	N/A	327	150	11.8	0.58
Conn Well - Pumping 5 HR	N/A	221	91	12.4	0.53
Conn Well - Pumping 5 HR	N/A	187	75	11.5	0.40
Conn Well - Pumping 24 HR	N/A	228	73	11.5	0.39
Conn Well - Pumping 24 HR	N/A	216	68	11.7	0.35

N/A = not available due to interferences in chromatogram*
1,1,1 TCE = 1,1,1 trichloroethane (contains trace trichloroethylene)
Tetra = tetrachloroethylene
Probe #1 = gas probe nearest conn well
Probe #2 = gas probe second nearest conn well
Goose #1 = goose neck vent directly beneath conn well
Goose #2 = goose neck vent third from railway tracks
* Levels above 15 ppm would have been detected and reported

Observations

The concentration of benzene in these samples was consistently low (less than 10 ppm) and in the case of the Conestoga Well samples, the concentration could not be determined due to interferences from alkyl hydrocarbons. The concentration of toluene ranges from 126 ppm (goose neck vents) to an average of 220 ppm in the active pumping samples. Without pumping, the concentration in the Conestoga Well is similar to that in the gas probes. Continuous pumping does not appear to significantly change the concentration of toluene or xylenes. The concentration of trichloroethane appears to increase approximately two-fold when the gas is pumped (6 ppm vs 12 ppm average). The concentration of 1,1,1 trichloroethane is lower in the shallow gas probes and goose neck vents. The concentration of tetrachloroethylene increases almost two-fold when pumped (0.34 ppm vs 0.42 ppm average). This figure relates to concentrations and not total amount of contaminants. The total volume of gas removed by pumping is much higher than natural venting and would have to be considered as a separate variable.

Conclusions

The selected volatile organics appear to increase in concentration almost two-fold when pumped actively versus passisvely. This is not the case for xylenes. The concentrations are lower in the gas probes and goose neck vents than in the Conestoga Well.

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